

CLAIMS

What is claimed is:

1. An ultrasonic test apparatus for polymeric materials comprising a low-absorption housing at least partially enclosing an ultrasound transducer that emits a low frequency wide angle ultrasound beam having a narrow bandwidth.
2. The apparatus of claim 1 wherein the low-absorption housing comprises high-impact polystyrene.
3. The apparatus of claim 1 wherein the low frequency is between about 1 MHz and about 5 MHz.
4. The apparatus of claim 1 wherein the ultrasound beam is emitted at a beam angle of between about 30 degrees and about 80 degrees, and most preferably of between about 40 and about 70 degrees.
5. The apparatus of claim 1 wherein the bandwidth is about $\pm 10\%$ of the low frequency.
6. The apparatus of claim 1 wherein the housing comprises high-impact polystyrene, and wherein the low frequency is about 2.25 MHz at a bandwidth of about $\pm 10\%$.
7. The apparatus of claim 6 wherein the ultrasound beam is emitted at a probe angle between about 30 and about 80 degrees, .
8. The apparatus of claim 1 wherein the polymeric material comprises a high impact resistant polystyrene.
9. The apparatus of claim 8 wherein the polymeric material is selected from the group consisting of high-density polyethylene, polypropylene, and polyvinylidene fluoride.
10. The apparatus of claim 1 further comprising an ultrasound receiver in pitch-catch arrangement with the transducer, wherein the ultrasound receiver produces a signal.
11. The apparatus of claim 10 wherein the signal is processed using a signal processing software that translates the signal into a visual output.

12. The apparatus of claim 11 wherein the visual output is displayed on a portable device that is electronically coupled to at least one of the transducer and ultrasound receiver.

11. A method of marketing an ultrasound test apparatus, comprising:

providing an apparatus that has a low-absorption housing at least partially enclosing
5 an ultrasound transducer, wherein the transducer emits a low frequency wide angle ultrasound beam having a narrow bandwidth; and

providing information that the apparatus is useful in detection of a flaw in a polymeric material.

12. The method of claim 11 wherein the housing is fabricated at least in part from high-
10 impact polystyrene, and wherein the low frequency is between about 1 MHz and about 5 MHz.

13. The method of claim 12 wherein the ultrasound beam is emitted at a beam angle of between about 40 degrees and about 70 degrees, and wherein the bandwidth is about $\pm 10\%$ of the low frequency.

14. The method of claim 13 wherein the ultrasound beam is emitted at a probe angle of about 60 degrees.

15. The method of claim 14 wherein the polymeric material is selected from the group consisting of high-density polyethylene, polypropylene, and polyvinylidene fluoride.

16. The method of claim 11 wherein the flaw is selected from the group consisting of an
20 inclusion, porosity, a lack of fusion, and a fracture.

17. The method of claim 16 wherein the information further includes advice that the lack of fusion is detected by a loss of at least one of a back wall echo and a lateral wave.

18. The method of claim 11 wherein the information further includes advice that the
25 apparatus will detect the flaw in the polymeric material, when the polymeric material has a thickness of up to 4 inches.

19. The method of claim 18 wherein the flaw has a size of less than 4% of the thickness of the polymeric material.

20. The method of claim 19 wherein the polymeric material comprises a butt weld of two pipes.